On the coupled simulation of mud motors
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ABSTRACT

The petrol Industry relies on the use of “mud motors” for the generation of the torque needed by the drill bit. Mud motors are essential inverse pumps in which a rotor is set into motion by the passage of a high pressure fluid. The simulation of such devices presents major challenges, since it requires taking into account the details of the contact between the rotor and the stator as well as considering the wetting and drying of large portions of the fluid domain, which “open” or “close” to the fluid flow due to the motion of the rotor with respect to the stator. Current work focuses on the simulation aspects, detailing in particular the FSI-related aspects. A description of the contact technique employed will also be provided together with details on the MPI implementation employed in the project [1],[2].

We remark in particular that an Immersed fluid solver is employed in following the motion of the rotor, thus making the FSI problem different from both classic FSI approaches [4] and of porous FSI problems [6]. Adaptive remeshing is used adopting the algorithm in [4]

REFERENCES